



Fall Protection

Awareness Training for Architects/Engineers and other inspectors involved in conducting Inspection, Investigation and Assessment work on roofs

Developed by
Navy Fall Protection Working
Group
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Training Outline

- Section 1: Introduction, Background and Purpose
- Section 2: Applicable regulations and Standards
- Section 3: Responsibilities and basic duties of the Inspection Team
- Section 4: Safe Work Practices
- Section 5: Safe Access
- Section 6: Protective Methods used when conducting inspection and investigation work

Training Outline (Continued)

- Section 7: Pre-Work Safety Verification Check
- Section 8: Procedures for Conducting Inspection and Investigation work
- Section 9: Training Requirements
- Section 10: References
- Section 11: Test Questions

Section 1

Introduction, Background and Purpose

Introduction

- Navy architects, engineers and other inspectors are required to access roofs of existing buildings and facilities for the purpose of conducting inspection, investigation and assessment work to determine:
 - Effect of roof deterioration, and
 - Develop course of action to upgrade, improve or replace roofing material (This may include developing construction drawings and specifications)

Introduction (Continued)

- Most Navy existing buildings and facilities have unprotected roof edges
- Navy A/Es will be required to be at heights and exposed to fall hazards when conducting roof inspection and investigation work



Background

- Roof systems of existing Navy buildings, facilities and structures can deteriorate over time due to:
 - Normal wear
 - Severe weather conditions (wind and snow loads)
 - Building movement (Settlement, material contraction and expansion)
 - Improper design, construction and maintenance

Background (Continued)

- Regular inspection and investigation of building roof systems will lead to:
 - Early detection of roof problems
 - Protection of Government capital assets, and
 - Maintain safe working environments for building occupants

Purpose

- Purpose of this training is to provide instructions and guidance to Navy A/Es and other inspectors performing roof investigation, assessment or inspections in a safe manner, and
- Protect Navy personnel from unexpected fall hazards from heights or falls on the same level

Purpose (Continued)

- This training is required to protect architects, engineers and other inspectors from falls while conducting inspection, investigation and assessment work on roofs of existing buildings and facilities
- This training does not apply to safety procedures for performing work on roofs by Public works personnel or roofing contractors

Section 2

Applicable Fall Protection Regulations, Standards and Instructions

Applicable OSHA Standards for Roof Inspection and Investigation Work

- 29 CFR 1926.500, Subpart M: FP in Construction
 - Applies to roof inspection and investigation work for the purpose of replacing, upgrading, improving, repairing or re-roofing
 - ✓ The above work is classified as pre-construction work, the use of fall protection systems is not required. This is in compliance w/Paragraph 29 CFR 1926.500(a) Exception
 - ✓ The Navy requires additional control measures that are more stringent than OSHA (See Section 6 for details)

Applicable OSHA Standards (Continued)

For conducting inspection, and investigation work on mechanical or other equipment located on roofs comply with:

General Industry Standards

- 29 CFR 1910, Subpart D: Walking Working Surfaces
- 29 CFR 1910: OSHA Notices of Proposed Rulemaking for Walking Working Surfaces and Personal Protective Equipment dated 24 May 2010

Applicable Standards for Performing Maintenance Work on Roofs

Navy Public Works Personnel performing maintenance work on roofs shall comply with:

- OPNAVINST 5100.23G: Navy Safety and Occupational Health Manual, Chapter 13
- OSHA General Industry Standards
 - 29 CFR 1910, Subpart D: Walking Working Surfaces General Industry Standards
 - 29 CFR 1910 Notices of Proposed Rulemaking dated 24 May 2010

Applicable Standards for Performing Construction Work on Roofs

- Contractors performing construction work on roofs shall comply with:
 - USACE EM 385-1-1: Safety and Health Requirements Manual
 - 29 CFR 1926.500



Section 3

Responsibilities and Basic Duties of the Inspection Team

Responsibilities

- Each individual performing roofing investigation, assessment and inspections is required to:
 - Ensure that he or she has the proper knowledge and awareness of fall hazards encountered, and
 - Fully complies with all required safety instructions and requirements addressed in this training

Responsibilities (Continued)

- The inspection team shall consist of more than one individual
- The head of inspection team is responsible for checking with the Command Safety Office at each activity to:
 - Determine if there are additional relevant local safety instructions and/or requirements affecting roof investigation and inspection work, and
 - Relaying that information to all team members

Responsibilities (Continued)

- Cooperation of each team member is vital to the success of the safety program
- Inspectors are responsible for their own safety and should always be alerted to avoid hazards caused by others

Responsibilities (Continued)

- If work cannot be performed safely, the inspector shall not proceed until provisions have been made to conduct inspection and investigation work in a safe manner

Basic Duties and Responsibilities of the Inspection and Investigation Team

- Observe all safety rules
- Work in accordance with established safety procedures
- Report unsafe conditions and work practices to your supervisor and Safety Office
- Conduct work activities in a manner that will not endanger yourself or others

Basic Duties and Responsibilities of the Inspection/Investigation Team (Continued)

- Assist new employees in safely carrying out their job duties when performing inspection and investigation work
- Report injuries immediately to the Command Safety Office
- Only undertake jobs that you understand

Section 4

Safe Work Practices

Safe Work Practices

- Do not access or perform inspection and investigation work on roofs unless trained appropriately
- Review roof hazard survey report developed by building owners or others to ensure proper risk assessment has been completed before accessing and/or commencing any work on roofs

Safe Work Practices (Continued)

- During Adverse weather conditions:
 - Ensure additional roof risk assessment on fall hazards has been completed when accessing and inspecting the roofs during adverse weather conditions

Safe Work Practices (Continued)

- Ensure you wear the following PPE at all times:
 - Proper footwear

- Depending on weather conditions suggest wearing the following:
 - Sunglasses
 - Sunscreen

Safe Work Practices (Continued)

- Ensure the Activity Safety office is aware of your presence/work on the roof and the expected time frame to perform the work and duration
- Do not work on roof alone – always work in pairs
- Ensure you have a form of communication link with Activity Safety Office (Cell phone, etc.)

Safe Work Practices (Continued)

- Ensure there is a safe method for accessing and exiting the roof
- Roof areas should be tidy and clean
 - If rubbish or stacked material interferes with accessing and performing inspection of the roof, do not proceed until it is safe to perform the work

Safe Work Practices (Continued)

- Ensure all ladders are safe and any scaffolding used for access is certified and safe
- Ensure there is a safe method of transporting equipment or tools to the roof area if needed

Safe Work Practices (Continued)

- Be familiar with Emergency Rescue Response Procedure and the Command fall hazard rescue plan as discussed with the Command Safety Office
- Make sure of the structural soundness of the roof and frame before a person walks on a roof

Safe Work Practices (Continued)

- Flat Roofs or minimum sloped roofs (Slope less than 4/12)
 - Personnel conducting inspection and investigation work shall not proceed to within 6 feet of the unprotected edge

Safe Work Practices (Continued)

- Flat roofs or minimum sloped roofs (continued)
 - If work is to be performed within 6 feet of the unprotected edge, appropriate safety precautions shall be taken to minimize the risk of falling (i.e. using elevating work platforms, scaffolding, temporary guard rails, fall arrest or restraint system)

Safe Work Practices (Continued)

- Pitched or sloped roofs
 - Roof with pitch of more than 4/12, too slippery to work from, or too fragile, work should only be carried out by the use of one or more of the following:
 - ✓ Elevating work platform, scaffold or guardrail
 - ❖ Working from elevating work platforms and scaffolds may require additional training, certification and procedures for safe use

Safe Work Practices (Continued)

- Pitched or sloped roofs (continued)
 - ✓ Roof Ladder (in conjunction with other devices (e.g. ladder climbing device))
 - ✓ If fall arrest or restraint system is used, proper training on the use of the equipment including hands-on and practical demonstration is required before performing the work

Safe Work Practices (Continued)

- Pitched or sloped roofs (continued)

Note: Guardrails are not appropriate for roofs with pitch exceeding 45 degrees

Section 5

Safe Access

Safe Access

Portable Ladder Safety

When accessing the roof

- Use only OSHA compliant ladders
- Only one person shall be on the ladder at any time
 - One person should secure the ladder while the other is climbing
- Ladder must extend a minimum of 3 – 3 ½ feet above roof edge

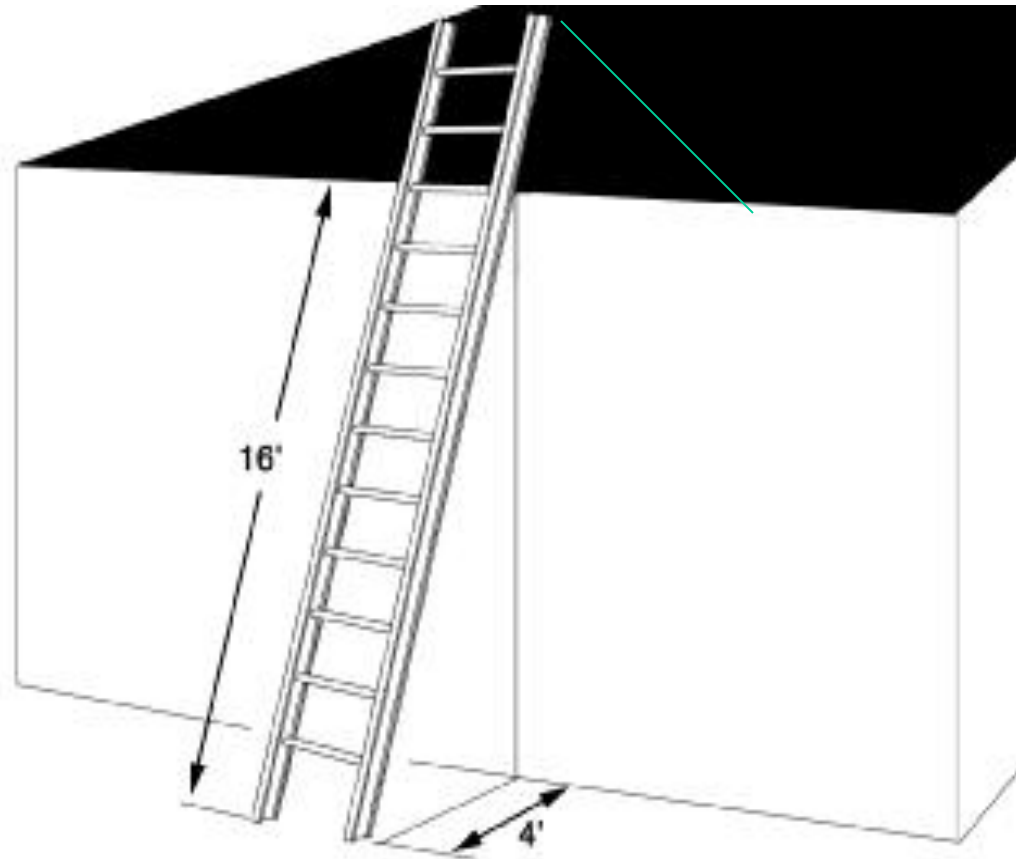
Safe Access (Continued)

Portable Ladder Safety (Continued)

- Ladder must be properly secured to roof edge immediately after initial ascent
- Maintain appropriate slope as outlined by OSHA (One foot run for every four feet rise)
- For additional portable ladder safe work practices see reference 2

Safe Access (Continued)

Slope:
4 vertical to 1
horizontal



Portable ladder setup

Safe Access using portable ladders (Continued)

- Access to Pitched Roofs
 - If a roof has a pitch of more than 4/12 or is too slippery to work from, or too fragile, then work should only be carried out by use of one or more of the following:
 - ✓ Elevating Work Platform,
Scaffolding

Using Aerial Work Platforms for access



Safe access to roofs using fixed ladders

- Per OSHA, fixed ladders longer than 24 feet require ladder climbing devices or cages
- If the ladder is less than 24 ft in length
 - ladder climbing devices or cages are not required to be installed on the ladders

Safe access to roofs using fixed ladders (Continued)

- To gain access to roof using a fixed ladder longer than 24 feet and the ladder is equipped with ladder climbing device:
 - Personnel using the ladder shall be trained on the safe use of the ladder climbing devices
 - If the ladder is equipped with cage, exercise caution when ascending or descending the ladder

Fixed Ladders with ladder climbing system

- Correct way to connect to a ladder
- The connector between front D-ring and the ladder cable shall be 9 inches long
- 100% transition at the top of the ladder is required



Cages installed on fixed ladders



- Care should be exercised when climbing ladder with cage

Safe access to roofs through a hatch in the middle of the roof

- When the hatch cover is opened to gain access to the roof using portable ladder, follow the requirements of portable ladder access

Safe access to roofs through a hatch in the middle of the roof (Continued)

- If the hatch cover is left opened, it becomes a fall hazard, to minimize the risk:
 - Close the cover immediately after gaining access, or
 - The hatch should have a method of fall protection (i.e. railing with a gate or other FP alternative should be in place)

Hatches

- Hatches shall always be protected when opened
- If ladder is used to access thru the hatch, it shall extend **3 – 3 ½** feet above the walking working surface



Section 6

Protective Methods used when
conducting inspection and
investigation work

Safe Zone

- After gaining access to the roof to conduct inspection, investigation or assessment
 - Work shall be conducted within the safe zone located at least **6 feet** away from the unprotected edge of the roof (see slide # 53 for definition of unprotected edge)
 - The **6 feet** area adjacent to the unprotected roof edge is called **control zone**

Safe Zone (Continued)

- Safe Zone method shall not be applied or used when the work involve inspection of equipment on roofs
- For inspection work involving mechanical or other equipment Use the Designated Area Method (See slides # 55 and 56)

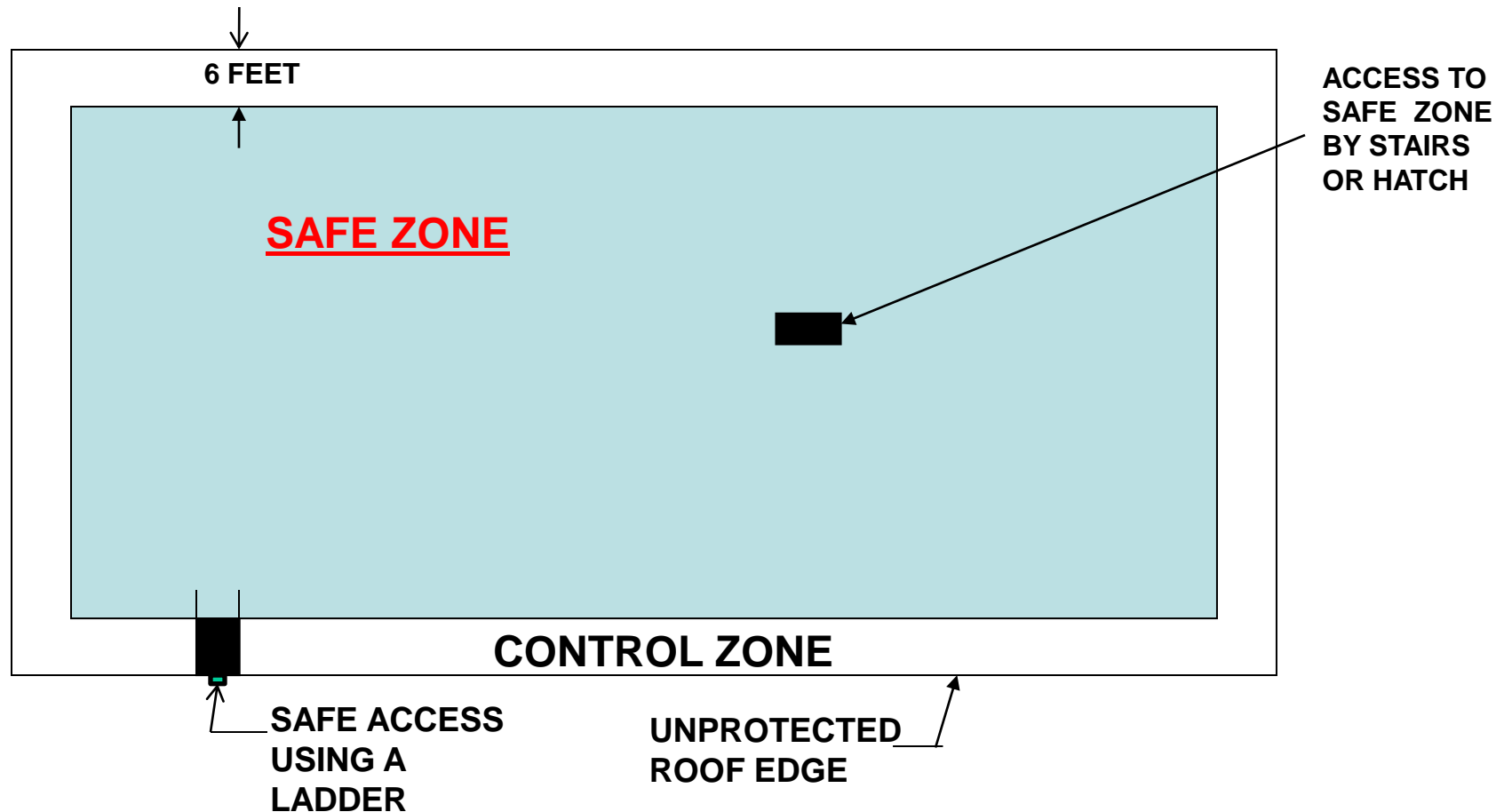
Investigation and investigation work within 6 feet of unprotected roof edge

- If there is a need to conduct inspection and investigation work within **6 feet** of the unprotected roof edge, including roof inspection (i.e. gutters or eave) or inspecting mechanical equipment at the roof edge, a fall protection method is required, See reference 2, Navy FP Guide for Ashore Facilities

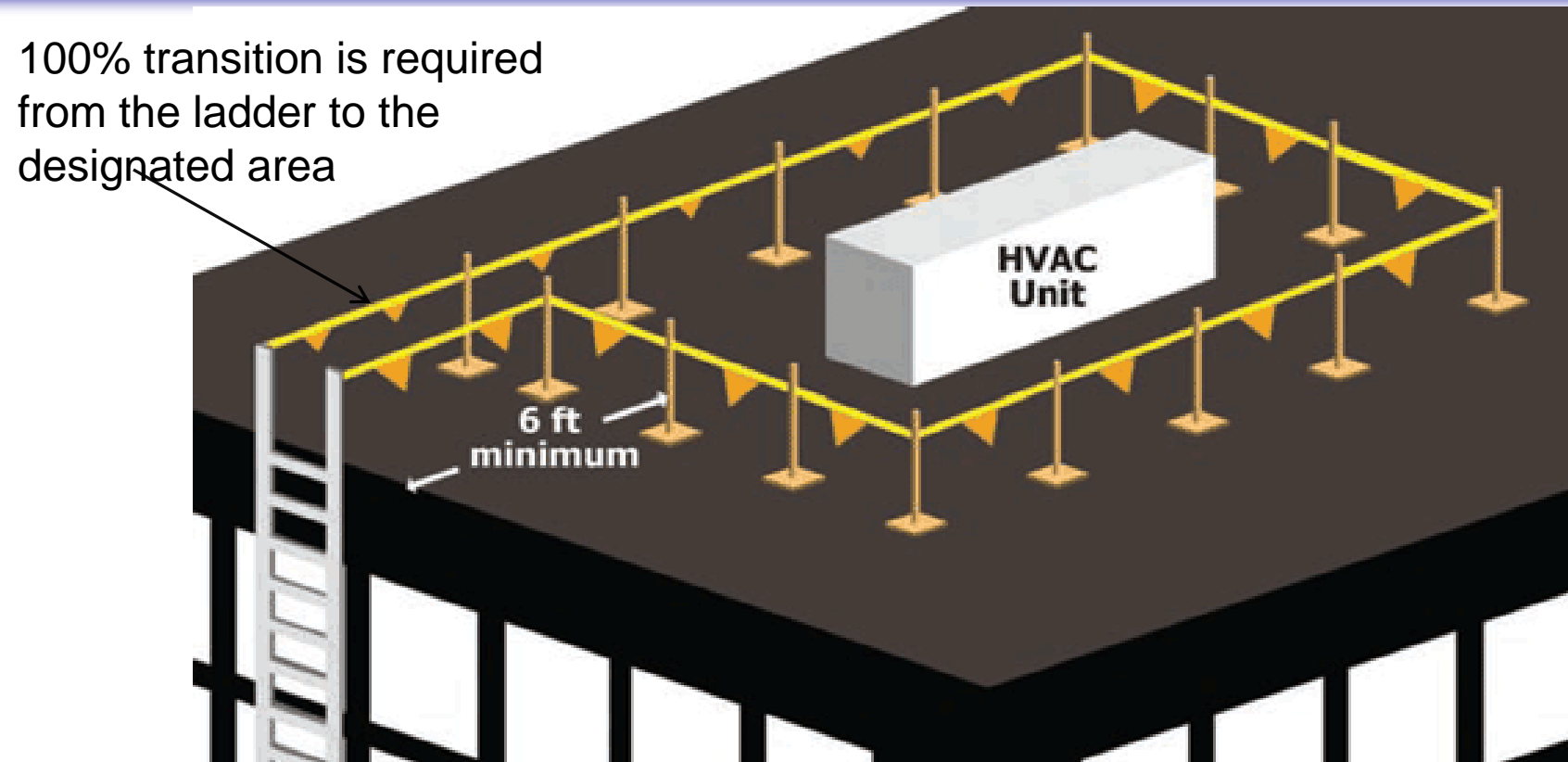
Definitions

- Unprotected roof edge:
 - Any edge of a roof or floor having edge protection less than 39 inches high (between 0 and 39 inches)
- Safe Zone:
 - The interior area of the roof, bounded by a 6 feet control zone all around the perimeter with unprotected edge
 - Inspection and investigation work can be performed in the safe zone without the use of a fall protection method

Control Zone on Roofs



Designated Area (For General Industry Work)



Designated area is used for inspection work of mechanical equipment (Other than roof inspections)

Requirements for Designated Area

- The perimeter line of the designated area consisting of a rope, wire or chain with stanchions (Caution tape is not permitted)
- The line shall have a minimum breaking strength of 500 lbs
- Stanchions must be capable of resisting without tipping a force of 16 lbs applied 30 inches above the roof surface

Requirements for Designated Area (Continued)

- The line shall be 34-39 inches high
- The designated area shall be located at least 6 feet away from the unprotected edge
- If access to the roof is at the side of the building, the area from the access point to the designated area shall also be protected (100% transition)

Additional Protective Measures

Additional Protective Measures for all inspection and investigation work

- All inspectors are required to:
 - **Wear proper clothing:**
 - Check the portable ladders before using to ensure they are:
 - ✓ Safe
 - ✓ In good working condition
 - ✓ Extend at least 3 rungs above the roof edge (extend 3 – 3 ½ feet)
 - ✓ Properly secured, and
 - ✓ Installed at proper slope

Section 7

Pre-work Safety Verification Check

Pre-Work Safety Verification Check

- Prior to beginning of the investigation, assessment and inspection work in any area of the roof where fall hazards exist, a pre-work safety verification check must be completed that includes the following items:
 - Ladders
 - Floor and wall openings
 - Roof condition
 - Work Procedures
 - Weather

Pre-work safety verification check (Continued)

- Ladders (Continued)
 - All ladders shall meet OSHA specifications for design and safety
 - Check for unsafe ladder conditions
 - Non-slip surfaces are in place on ladder rungs

Pre-Work safety verification check (Continued)

- Floor and wall openings
 - All floor and wall openings (such as open roof access hatches or other openings including skylights) due to ongoing construction or repair work are safely covered or blocked from access

Pre-Work safety verification check (Continued)

- Floor and wall openings (Continued)
 - If not safely covered and blocked from access, the openings will have someone assigned for constant attendance until inspection and investigation work is complete
 - Stay at least 6 feet away from skylights or other openings that are not protected

Skylights



Unprotected skylights

Pre-Work Safety verification check (Continued)

- Roof Condition
 - Verify the roof slope does not exceed 4 inches per foot
 - Conduct interviews with local personnel familiar with the roof construction
 - Conduct visual inspection of roof structural deck underside to identify potential safety issues with the deck
 - Ensure the roof surface is not slippery due to water, algae, dirt, and debris that would preclude firm footing

Pre-Work Safety verification check (Continued)

- Work Procedures

- If any one of the conditions described in Pre-Work Safety Verification Check is not met for the area or piece of equipment to be inspected and posing a potential fall hazard, then employees may not perform that work until the condition is corrected

Pre-Work Safety verification check (Continued)

- Work Procedures (Continued)
 - If the condition cannot be remedied immediately, a supervisor or project manager must be notified of the problem

Pre-Work Safety Plan (Continued)

- Work Procedures (Continued)
 - If the use of fall protection equipment such as harnesses and lanyards are required because the fall hazard cannot be reduced to a safe level for roof inspection
 - ✓ Employee shall utilize the normal safety procedures as per the Command Safety Office requirements
 - ✓ Receive the proper training on the use of FP equipment

Basic Fall Arrest System Components



Pre-Work Safety Verification Check (Continued)

- Weather
 - Check current weather to ensure none of the conditions listed previously exist
 - The weather will not impact the inspection and investigation work

Section 8

Procedures for Conducting Inspection and Investigation work

Procedures for Conducting Inspection and Investigation

- The inspection team will typically consist of a minimum of two individuals
- One individual shall be designated as a safety monitor/recorder and assist the inspector by maintaining visual and verbal contact at all times during the inspection work

Procedures for Conducting Inspection and Investigation (Continued)

- The other member of the team shall conduct the actual inspection as per the specifics of the job
- Inspection personnel shall conduct themselves in a manner that does not endanger themselves and other members of the inspection team

Section 9

Training Requirements

Training Requirements

- In addition to this training, all personnel conducting investigation, assessment and inspection work shall receive **slips trips and falls training**. Training can be accessed at:
 - Enterprise Safety Application Management Systems (ESAMS) training course # 1259
 - E-Learning – Course #
 - Knowledge On Line (NKO) – Course #

Training Requirements (Continued)

- If roof inspection and investigation work is required in the Control Zone (within 6 feet from the unprotected edge of the roof) or outside the Designated Area when inspecting mechanical equipment and personal protective equipment is used, additional training is required on the safe use of the PPE prior to the start of work

Training Requirements (Continued)

- Available Training for End users using FP equipment:
 - ESAMS Course # 2018 (Web Based) and
 - ESAMS Course # 3042 (Outline for Hands-On training)
 - ✓ The Command Competent Person for FP shall deliver the Hands-On Training
- The above training is also available at:
 - E-Learning – Course # xxxx
 - Knowledge On Line (NKO) – Course # xxx

Section 10

References

References

1. OPNAVINST 5100.23 Series, Navy Safety and Occupational Health (SOH) Program manual
2. Navy Fall Protection Guide for Ashore Facilities dated 8 September 2009
3. 29 CFR 1926.500 Fall Protection in Construction
4. 29 CFR 1910: Occupational Safety and Health Standards for General Industry
5. 29 CFR 1910: Notices of Proposed Rulemaking dated 24 May 2010

Test Questions

Section 1 Test Question

1. Regular inspection of building roof systems will lead to:
- a) Protection of Government capital assets
 - b) Detection of roof problems
 - c) Maintain safe work environment for building occupants
 - d) All of the above
 - e) None of the above
 - f) a & b

Section 2 Test Question

2. The criteria for performing construction work on roofs is addressed in:
- a) OPNAVINT 5100.23G
 - b) 29 CFR 1910
 - c) USACE EM 385-1-1
 - d) All of the above
 - e) a and b
 - f) c

Section 2 Test question

3. Inspection and investigation work conducted on existing roofs is prescribed by:
- a) 29 CFR 1926
 - b) 29 CFR 1910
 - c) a and b
 - d) a
 - e) b

Section 2 Test Question

4. Personnel conducting inspection and investigation work on HVAC equipment located on a roof shall comply with:
- a) 29 CFR 1926
 - b) 29 CFR 1910
 - c) USACE EM 385-1-1
 - d) All of the above
 - e) All of the above
 - f) None of the above
 - g) a
 - h) b
 - i) c

Section 3 Test Question

5. Architects and Engineers performing roof inspection and investigation work are required to:
- a) Fully complies with all required safety instructions and requirements
 - b) Receive proper training
 - c) a and b
 - d) a
 - e) b

Section 3 Test Question

6. If inspection and investigation work required to be conducted by the architects and engineers cannot be performed safely, they shall proceed with caution:
- a) True
 - b) False

Section 3 Test Question

7. The duties and responsibilities of the team conducting roof inspection and investigation work on roofs shall:
- a) Comply with all established safety requirements and procedures
 - b) Report unsafe conditions to the safety office after performing the work
 - c) Conduct work activities in a manner that will not endanger any team member
 - d) All of the above
 - e) a and b
 - f) b and c
 - g) c

Section 4 Test Question

8. When conducting roof inspection, the following safe work practices shall be implemented:
- a) Ensure ladders used for access are safe
 - b) When there is a need to use equipment or tools during inspection work, ensure there is a safe method for transporting them to the roof;
 - c) If boxes or material is blocking the access to the roof, push them aside to facilitate access;
 - d) All of the above
 - e) None of the above
 - f) a and b

Section 4 Test Questions

9. Prior to conducting the inspection work, ensure to let the building owner know that the team is conducting inspection work:
- a) True
 - b) False
10. On flat roofs when inspecting the unprotected edge of the roof or gutters, proceed to get closer to within 2 feet from the edge provided someone from the inspection team is observing you:
- a) True
 - b) False

Section 5 Test Question

11. When accessing the roof using portable ladders:

- a) The ladder must be long enough to extend at least two feet above the roof edge
- b) Only one person shall be on the ladder at any time
- c) Maintain appropriate slope for the ladder
- d) a and b
- e) b and c
- f) a and c
- g) All of the above

Section 5 Test Question

12. When accessing the roof using fixed ladders over 24 long:

- a) Only one person is required on the ladder
- b) Ladder climbing device is required to be used
- c) Personnel using fixed ladder for access shall be trained accordingly
- d) a and b
- e) a and c
- f) b and c
- g) None of the above

Section 5 Test Question

13. When the hatch on a roof is opened after access:

- a) Close the cover immediately after access
- b) Have a fall protection method in place
- c) a and b
- d) a or b
- e) b
- f) None of the above

Section 6 Test Question

14. After gaining access to the roof to conduct inspection work:
- a) The work can be conducted within the safe zone
 - b) The safe zone is located 6 feet away from the unprotected edge
 - c) The 6 feet adjacent to the unprotected edge of the roof is called uncontrolled zone
 - d) All of the above
 - e) Only a
 - f) a and b
 - g) b and c
 - h) None of the above

Section 6 Test Questions

15. Safe zone method can be applied when inspecting mechanical equipment located on roof with unprotected edges:
- a) True
 - b) False
16. Designated area is a method applied to inspect or investigate mechanical equipment installed on roofs with unprotected sides or edges:
- a) True
 - b) False

Section 6 Test Question

17. The following are the additional protective measures that can be used to protect personnel conducting inspection and investigation work on roofs with unprotected sides or edges:

- a) Wearing proper clothing
- b) Inspect portable ladders before using
- c) Only a
- d) Only b
- e) a and b
- f) None of the above

Section 7 Test Question

18. All floor or wall openings shall be safely covered or blocked from access. If not covered, someone should be assigned for constant attendance until inspection work is completed:
- a) True
 - b) False

Section 7 Test Question

19. Pre-Work Safety Verification Check include the following:

- a) Verification of roof slope
- b) Conduct visual inspection of the roof structural underside
- c) Ensure roof surface is not slippery
- d) a and b
- e) b and c
- f) All of the above
- g) None of the above

Section 8 Test Question

20. The proper procedures for conducting inspection and investigation work should include the following requirements:
- a) The inspection team consists of a minimum of two people
 - b) One individual is designated as a safety monitor/recorder
 - c) The other member of the team shall conduct the actual inspection as per the specifics of the project
 - d) None of the above
 - e) a and b
 - f) b and c
 - g) a and c
 - h) All of the above

Section 9 Test Question

21. Training is required for:

- a) Personnel conducting roof inspection and investigation work in a safe manner
- b) In addition to this training all individuals conducting inspection work shall also required to receive Slips, Trips and falls training
- c) Only a
- d) Only b
- e) a and b

Test Answers

1. d)

2. c)

3. a)

4. b)

5. c)

6. b)

7. d)

8. f)

9. b)

10. b)

11. e)

12. f)

13. d)

14. f)

15. b)

16. a)

17. c)

18. a)

19. f)

20. h)

21. e)